

# Ambulatory Care for Cancer in the United States: Results from Two National Surveys Comparing Visits to Physicians' Offices and Hospital Outpatient Departments

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**Background:** Among the general population, type of health insurance has been reported to affect the location of ambulatory visits and the content of those visits. We examined where cancer patient visits occurred (physicians' offices or hospital clinics), and whether anticancer therapy is administered or prescribed.

**Methods:** Cross-sectional study using National Ambulatory Medical Care Survey and National Hospital Ambulatory Care Survey (NAMCS/NHAMCS) data to characterize ambulatory cancer patient visits from 2001–2003. Multivariable logistic regression analyses were performed to identify factors associated with where a cancer patient went for care (office practice versus hospital clinic) and anticancer therapy received.

**Results:** Thirteen percent of patients visited hospital clinics, with the remainder visiting office-based settings. Younger cancer patients and those with Medicaid were more likely to visit hospital clinics compared to older and privately insured cancer patients. Cancer patients with <6 visits in the last year were less likely to be seen in the office setting. Patients with lung cancer, lymphoma/leukemia and melanoma were less likely to have anticancer therapy administered or prescribed compared to breast cancer patients. The uninsured were less likely to have anticancer administered or prescribed compared with the privately insured.

**Conclusions:** Cancer patients with Medicaid were more likely to visit hospital clinics than privately insured patients. Treatment was associated with cancer type, not where care occurred and health insurance type, though there was a trend for the uninsured and those insured by Medicaid to be less likely to be administered or be prescribed anticancer therapy.

**Key words:** health insurance ■ cancer

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## BACKGROUND

The fragmentation of the U.S. healthcare system makes it difficult to track cancer patient care.<sup>1,2</sup> One of the gaps in our knowledge about cancer care is whether the type of health insurance affects the setting of care and treatment received. If systematic differences in care are noted by setting, this might impact long-term outcomes such as cancer recurrence and survival. We know that state-of-the-art cancer treatment prolongs survival of cancer patients.<sup>3,4</sup>

The fate of cancer patients from underserved groups is of great concern, and yet not a great deal is known about their visits to ambulatory care centers. The literature indicates that poor, uninsured patients are less likely to have access to specialists, which is important for obtaining high-quality care for cancer.<sup>5–10</sup> Academic health centers<sup>11</sup> and large urban hospitals<sup>5</sup> are seeing larger proportions of the uninsured, those insured by Medicaid and low-income populations. These practice settings are often operating with limited resources, as they frequently have large numbers of uninsured patients or Medicaid enrollees they are obligated to serve. The reasons include private physicians not accepting new patients without insurance or with Medicaid<sup>12</sup> as well as patient preferences for a setting with more flexible hours.<sup>13,14</sup> A confluence of all these factors might act to limit access to care and affect the content of that care once cancer patients access the healthcare system.<sup>1,2</sup>

As an initial step in describing care for cancer patients in the United States, we used the 2001–2003 National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS) to examine where cancer patients are seen in the ambulatory setting (office-based versus hospital clinics) and whether anticancer therapy was ordered or given during those visits.

# MATERIAL AND METHODS

## Setting and Data Collection Process

The NAMCS and the NHAMCS are national probability surveys designed to provide objective, reliable information about the provision and use of ambulatory medical care services.<sup>15</sup> These surveys allow nationally representative estimates of ambulatory visits made annually to the participating facilities. The NAMCS samples visits made to office-based physicians not employed by the federal government. Physicians were identified from the master files of the American Medical Association and the American Osteopathic Association. Each physician was randomly assigned a one-week reporting period. During this time, data from a systematic random sample of visits were recorded on a designated encounter form. Data were obtained on symptoms, physician's recorded reason for the visit, patient's

chief complaint, diagnoses, and medications ordered or provided. The NAMCS also obtained data on the demographic characteristics of patients and specialty of provider. Anesthesiologists, pathologists, radiologists and physicians with no direct ambulatory care responsibilities were excluded. The survey was conducted annually from 1973–1981, in 1985, and 1989 henceforth.

The NHAMCS, which has been conducted annually since 1991,<sup>15</sup> uses a sample of visits to emergency departments and outpatient departments of nonfederal, short-stay general hospitals. Clinics specializing in radiology, laboratory services, physical rehabilitation or other ancillary services are not surveyed. The NHAMCS obtains a sample of hospitals from the 2000 SMG Hospital Database (SMG Marketing Group Inc., Chicago, IL).<sup>16</sup> During the randomly assigned four-week reporting period, data for a systematic random sample of visits are recorded on a dedicated encounter form. As

**Table 1. Cancer patient characteristics (office-based providers and hospital-based clinics), 2001–2003**

Characteristics	All Visits	Weighted Distribution	Office-Based Providers (n)	Weighted Distribution	Hospital-Based Clinic (n)	Weighted Distribution	P Value*
	Un-W N	(% SE)	Un-W N	(% SE)	Un-W N	(% SE)	
Total	5,011	—	1501	86.7 (2.0)	3510	13.3 (2.0)	
Age (Years)							<0.00001
<24	497	4.0 (0.8)	†	†	468	15.3 (3.7)	
25–44	447	10.3 (1.6)	94	10.4 (0.8)	353	9.7 (1.4)	
45–64	1,880	35.8 (0.9)	470	35.1 (2.2)	1,410	40.5 (2.7)	
65–74	1,194	24.4 (1.6)	432	25.3 (1.9)	762	18.5 (1.8)	
≥75	993	25.5 (2.0)	476	27.0 (2.3)	517	16.0 (1.7)	
Race							NS
White	4,304	88.6 (1.5)	1281	89.1 (1.7)	3,020	85.5 (2.0)	
Black	594	8.6 (1.3)	170	8.1 (1.5)	424	11.3 (1.7)	
Other	113	3.9 (0.7)	50	2.8 (0.8)	63	3.1 (0.9)	
Hispanic Ethnicity							NS
Yes	321	8.1 (1.7)	89	7.5 (1.9)	232	12.3 (2.4)	
No	4,292	82.7 (2.5)	1211	82.6 (2.9)	3,081	82.8 (2.7)	
Unknown	398	9.2 (2.0)	201	9.9 (2.4)	197	4.9 (1.6)	
Sex							0.06
Female	2,514	52.1 (2.5)	544	51.3 (2.8)	1,969	57.6 (2.1)	
Male	2,498	47.9 (2.5)	957	48.7 (2.8)	1,541	42.4 (2.1)	
Health Insurance							0.001
Private	1,973	42.9 (2.9)	586	42.8 (3.2)	1,387	43.9 (2.6)	
Medicare	1,880	41.8 (2.2)	733	43.8 (2.5)	1,147	28.9 (2.5)	
Medicaid	556	4.5 (0.8)	47	3.1 (0.9)	509	13.6 (1.7)	
Uninsured	155	3.0 (1.0)	†	†	130	3.9 (0.8)	
Other	198	2.9 (1.0)	63	2.8 (1.1)	135	3.5 (0.9)	
Unknown	249	4.7 (1.7)	47	4.5 (1.8)	202	6.1 (1.6)	
Patient's Reason for Visit							0.0011
Symptoms	737	21.2 (2.5)	254	22.2 (2.9)	483	14.9 (1.8)	
Cancer	1,520	31.0 (2.6)	583	31.6 (3.0)	937	27.9 (3.8)	
Chemotherapy/injections	595	3.8 (0.5)	77	2.9 (0.5)	518	9.6 (1.6)	
Exams/tests/meds	684	13.2 (1.9)	189	12.8 (2.2)	495	16.1 (2.7)	
Pre-/postoperative/other follow-up	948	20.7 (4.1)	286	21.6 (4.7)	662	15.2 (2.0)	
Other	527	10.0 (1.6)	112	9.0 (1.7)	415	16.8 (2.4)	

in the NAMCS, data are obtained on symptoms, physician's recorded reason for the visit, patient's chief complaint, diagnoses, and medications ordered or provided. The survey also obtains data on the demographic characteristics of patients. For this analysis, visits to the emergency room were not examined as we were interested in ambulatory cancer care during visits. The annualized response rate for NAMCS was 65% and 91% for NHAMCS hospital-based clinics.<sup>15</sup>

## Study Population

The study population was defined by the primary reason for the visit recorded by the healthcare provider. This included 5,011 visits made to both settings (3,510 visits to hospital clinics and 1,501 to office-based practices). Weights were created to transform these visits to represent patients.<sup>17</sup> International Classification of Diseases versions 9.0 (ICD-CM-09) categories were used

from 140–208.<sup>18</sup> Cancer type was categorized as follows: larynx, lung = 161–162; female breast = 174; prostate = 185; colon, rectum = 153, 154; leukemia/lymphoma = 200–208; melanoma = 172; other = all other malignancies.<sup>18</sup> Those with nonmelanoma skin cancer were excluded (ICD-CM-09 = 173).

## Variables Examined

Four demographic characteristics were examined: age at visit, sex, race and ethnicity. Since we were interested in describing cancer care of all age groups, we combined all patients aged <25 years old into one group. Inclusion criteria for clinical trials allow patients ≤21 to be enrolled. We included patients between 21–24 with the youngest age group as these patients represented <1% of the total population. Other variables examined included setting (office based, hospital based); type of health insurance, including private, Medicaid/SCHIP,

Table 1. continued

Characteristics	All Visits	Weighted Distribution	Office-Based Providers (n)	Weighted Distribution	Hospital-Based Clinic (n)	Weighted Distribution	P Value*
	Un-W N	(% SE)	Un-W N	(% SE)	Un-W N	(% SE)	
Primary Care Provider							0.0014
Yes	568	13.5 (2.0)	190	14.3 (2.4)	378	8.4 (2.0)	
No	4,269	83.9 (2.0)	1,277	84.0 (2.3)	2,992	83.7 (2.8)	
Unknown	174	2.6 (0.4)	†	†	140	7.3 (1.7)	
Provider's Major Reason for Visit							NS
Acute problem	684	23.3 (2.6)	237	23.0 (2.9)	447	25.1 (3.8)	
Chronic problem (routine)	3,258	49.2 (4.1)	846	48.7 (4.7)	2,412	52.9 (4.0)	
Chronic problem (acute)	276	5.2 (1.0)	76	4.9 (1.2)	200	6.9 (1.3)	
Pre-/postsurgery	512	14.7 (2.2)	256	15.6 (2.6)	256	8.8 (1.9)	
Preventive care	64	2.8 (0.6)	29†	3.0 (0.7)	35	1.8† (0.9)	
Unknown	217	4.9 (1.2)	57	4.9 (1.4)	160	4.6 (1.5)	
Visits in Last Year							0.0001
New Patient	343	23.9 (3.1)	104	23.9 (3.1)	239	23.7 (2.7)	
None	89	6.2 (1.3)	39	6.2 (1.5)	50	5.6 (1.5)	
1–2	891	28.7 (2.9)	381	29.6 (3.5)	510	22.6 (3.7)	
3–5	1,161	15.5 (1.7)	452	15.7 (2.0)	709	14.1 (1.4)	
≥6	2,289	13.6 (1.5)	444	11.5 (1.5)	1,845	27.2 (2.6)	
Unknown	238	12.2 (6.4)	81	13.1 (2.3)	157	6.7 (2.7)	
Cancer Site†							0.0001
Lung/larynx	464	7.8 (1.3)	75	7.1 (1.4)	389	11.4 (1.7)	
Female breast	894	20.2 (2.0)	236	20.6 (2.3)	658	17.2 (2.3)	
Prostate	775	17.5 (2.1)	579	19.4 (2.6)	196	5.1 (0.9)	
Colorectal	426	11.8 (1.8)	113	12.5 (2.0)	313	7.0 (0.9)	
Lymphoma/leukemia	874	13.2 (1.6)	106	11.9 (1.8)	768	21.3 (2.2)	
Melanoma	155	5.0 (1.2)	53	5.2 (1.4)	102	3.4 (1.0)	
Other	1,423	24.7 (1.6)	47	23.2 (1.8)	1,084	34.5 (3.0)	
Anticancer Therapy*							0.17
Yes	1,253	14.8 (2.7)	326	14.1 (3.1)	927	18.9 (1.8)	
No	3,758	85.2 (2.7)	1,175	85.9 (3.1)	2,583	81.1 (1.8)	

Un-W: unweighted; # Chi-squared test was used to determine differences between office-based clinics and office-based providers; \* Visits were considered cancer related if the principal diagnosis was coded as malignant neoplasm (ICD-CM-09 = 140–208). These estimates exclude nonmelanoma skin cancer; † Values are suppressed because cells contain <30 observations; ‡ In the 9th Edition of the International Classification of Diseases (ICD-CM-09): larynx, lung = 161–162; female breast = 174; prostate = 185; colon, rectum = 153, 154; lymphoma/leukemia = 200–208; melanoma = 172; other cancers = all other malignancies<sup>18</sup>; ∞ Anticancer therapy administered or prescribed during the visit, including antineoplastics; hormonal or biological response modifier; antimetabolites; antibiotics, alkaloids, or enzymes; or DNA-damaging drugs.<sup>19</sup>

Medicare, worker's compensation, uninsured (self-pay and no charge/charity), other and unknown; patient's chief complaint as recorded in the chart; whether the patient was seen by a provider who considered themselves the patient's primary care provider; reason for visit recorded by the provider; and the number of visits in the year prior to the current visit. Cancer type was collapsed as described above.<sup>18</sup> All analyses excluded nonmelanoma skin cancer. We compared anticancer agents administered or prescribed by the type of cancer using the National Drug Code Directory.<sup>19</sup> Anticancer therapy administered or ordered/prescribed during the visit included antineoplastics; hormonal or biological response modifier; antimetabolites, including antibiotics, alkaloids, or enzymes; or DNA-damaging drugs.

Two dichotomous outcome variables were created for examination in a multivariable logistic regression analysis: 1) whether the patient had been seen in an office-based setting or a hospital-based clinic, and 2) whether the patient had anticancer therapy administered or prescribed/ordered during the visit.

## Statistical Analysis

Descriptive analyses were performed to examine differences in patient demographics and visit characteristics by setting of visits. Differences between visits to office-based physicians and hospital clinics were tested using the Chi-squared test of homogeneity. Logistic regression modeling was employed to estimate the relative odds of a patient visiting a hospital-based clinic and whether anticancer was administered or prescribed/ordered dur-

ing the visit based on patient's characteristics. Adjusted odds ratios are significant if 95% CIs do not cross 1.0. To account for the complex sampling design of the NAMCS and the NHAMCS, all estimates presented here have been adjusted using weights provided by the NCHS.<sup>12,16</sup> Person-level weights were applied to represent estimates of cancer patients visiting ambulatory care settings. Data were analyzed using SAS statistical software, version 8.2 with SUDAAN version 9.0. All estimates based on  $\leq 30$  observations were suppressed.

## RESULTS

### Demographic Health Insurance Characteristics

Table 1 presents overall cancer patient characteristics and breakdown by setting. Overall, 86.3% of cancer patients visited hospital-based clinics with 13.3% visiting office based practices. Approximately 86% cancer patients were  $\geq 45$  years, with whites accounting for 88.6%, blacks 8.6% and Hispanics 8.1%. More young cancer patients visited hospital-based clinics compared to older cancer patients ( $p \leq 0.00001$ ), as well as more blacks and Hispanics compared to whites—though these differences were not statistically significant. Overall, more women cancer patients went to see a healthcare provider than men (52.0% vs. 48.0%), and this relationship was the same in both settings of care ( $p = 0.06$ ).

Cancer patients with private insurance and Medicare accounted for 84.7% of all cancer patient visits from 2001–2003, with 4.5% of cancer patients insured

**Table 2. Distribution of cancer patient visits by type of cancer by setting, 2001–2003**

Types of Cancer	All	Lung/ Larynx	Female Breast	Prostate	Colorectal	Lymphoma/ Leukemia	Melanoma	All Others
Sample Size	5,011	464	894	775	426	874	155	1,423
Location (%)								
Office	86.7	80.5	88.7	96.1	82.1	78.5	91.0	81.5
Hospital clinic	13.3	19.5	11.3	3.9	7.9	21.5	9.0	18.5
Office Visits (%)	1,501							
Oncology†	30.0	22.9	41.1	7.0	39.3	67.0	3.9	23.4
Urology	18.6	∞	∞	76.9	∞	∞	∞	15.0
General surgery	13.8	3.0	33.3	∞	27.0	7.4	16.6	6.9
Primary care	13.5	30.7	8.4	13.9	7.4	17.6	3.6	15.9
Dermatology	4.9	∞	∞	∞	∞	∞	71.3	4.8
Other	19.1	43.4	17.2	∞	9.7	7.1	4.6	33.9
Hospital Clinic Visits (%)	3,501							
General medicine	65.3	85.9	84.4	52.5	84.4	53.0	74.5	53.8
Surgery	13.9	8.8	11.0	42.0	11.1	9.2	21.4	15.7
Pediatrics	12.8	∞	∞	∞	∞	34.0	∞	15.9
Obstetrics/gynecology	4.3	∞	3.8	∞	1.8	∞	∞	9.1
Other	3.6	4.3	0.7	5.3	2.7	2.6	∞	5.6

\* Visits were considered cancer related if the principal diagnosis was coded as malignant neoplasm (ICD-CM-09 = 140–208); † In the 9th Edition of the International Classification of Diseases (ICD-CM-09): larynx, lung = 161–162; female breast = 174; prostate = 185; colon, rectum = 153, 154; lymphoma/leukemia = 200–208; melanoma = 172; other = all other malignancies<sup>18</sup>; ‡ Oncology specialty includes gynecologic oncology, hematology, medical oncology and hematology/oncology. No breakdown by specialty was given for hospital-based clinics; ∞ Values are suppressed because cells contain  $<30$  observations or relative standard error is  $>30$ .

by Medicaid and 3.0% of individuals being uninsured. Higher proportions of Medicaid-insured and uninsured cancer patients visited hospital-based clinics, while office-based practices saw more cancer patients with Medicare (43.8% vs. 28.9%). Private insurance covered similar proportions of cancer patients visiting both settings (42.8% office, 43.9% hospital clinics) ( $p=0.001$ ).

## Characteristics of the Cancer

Six types cancer accounted for approximately 75.3% of cancer patient visits: lung, female breast, prostate, colorectal cancer, leukemia/lymphoma and melanoma (Table 1). Higher proportions of patients with lung/laryngeal cancer and leukemia/lymphoma were seen in hospital-based clinics, while higher proportions of patients with female breast, prostate, colorectal cancer and melanoma were seen in private doctors' offices ( $p=0.0001$ ). Fifteen percent of all ambulatory cancer patients had anticancer therapy administered or ordered/prescribed during their visit. Such therapy was administered or ordered/prescribed for 14.1% of cancer patients who visited physician offices and for 18.9% of patients that visited hospital-based clinics.

## Setting of Care

Overall, 86.7% of cancer patients visited hospital-based clinics, with 13.3% visiting office-based practices (Table 1). In Table 2, we examined differences in setting of care and providers seen by type of cancer. Thirty percent of the patients seen in office-based practices were seen by oncology specialists, 19% urologists, 13.8% general surgeons and 13.5% primary care providers. Variation was seen across cancer type; 76.9% of prostate cancer patients were seen by urologists and 67% of leukemia/lymphoma patients visited oncology specialists (Table 2). Almost one-third of lung cancer patients were seen by primary care providers. Approximately 40% of breast and colorectal cancer patients saw oncologists; about one-third and one-quarter visited general surgeons, respectively.

Within the hospital clinic setting, 65% of cancer patients visited general medical clinics, while 12.8% visited pediatric clinics and 13.9% visited surgery clinics. Thirty-four percent of leukemia and lymphoma patients were seen in pediatric clinics. More than 84% of breast and colorectal cancer patients were seen in general medicine clinics, with 52.5% of prostate cancer patients seen in surgical clinics.

## Predictors of Cancer Patients Visits to Hospital Clinics (versus Physicians' Offices)

In the multivariate logistic regression model predicting setting of care (Table 3), we found that cancer patients aged  $<25$  were more likely to be seen in hospital clinics compared to cancer patients aged  $>75$  years

(OR=9.4; 95% CI: 2.78–31.8), with those between 45–64 years being twice as likely to be seen in hospital clinics. Patients with Medicaid were more likely to visit hospital clinics compared to patients with private insurance (OR=4.09; 95% CI: 2.10–7.96). The uninsured were also more likely to visit hospital clinics, but this difference was not significant (OR=1.63; 95% CI: 0.68–3.92). Cancer patients seen for symptoms were less likely to visit the hospital clinic (OR=0.39; 95% CI: 0.21–0.75) compared to those seen for reasons other than cancer, chemotherapy/injections, exams/tests/medications, or preoperative or postoperative care.

Cancer patients who visited the provider for pre or post surgical care were less likely to visit hospital clinics (OR=0.40; 95% CI: 0.19–0.86) compared to patients seen for chronic routine problems. New patients, those with less than 5 visits in the past year were less likely to visit hospital-based clinics compared to those with  $\geq 6$  visits. Prostate cancer patients were less likely to be seen in a hospital clinic compared to breast cancer patients (OR=0.32; 95% CI: 0.15–0.72). Lung or larynx cancer patients were twice as likely to be seen in hospital-based clinics (OR=1.99; 95% CI: 0.98–4.06).

## Predictors of Administration or Prescription of Anticancer Therapy

In the multivariate logistic regression model predicting the administration or ordering/prescription of anticancer therapy (Table 4), we found that cancer patients who visited their provider for chemotherapy or other injections were more likely to have anticancer therapy associated with the visits made for other reasons (OR=6.75; 95% CI: 1.85–24.7). Those who visited the doctor or clinic for preoperative, postoperative or follow-up care were also more likely to have anticancer therapy administered (OR=3.28; 95% CI: 1.28–8.37). Cancer patients without insurance and those with Medicaid were less likely to receive anticancer therapy, though these differences were not statistically significant. New cancer patients or those with  $<6$  visits in the previous year were less likely to have anticancer therapy administered or prescribed compared to patients with  $\geq 6$  visits in the previous year. Finally, cancer patients with leukemia/lymphoma, melanoma, lung/laryngeal cancer and "all other cancers" had a lower likelihood of having anticancer therapy given or prescribed compared to breast cancer patients (Wald Chi square = 18.1;  $P<0.00001$ ). Location of the visit did not impact whether patients had anticancer therapy administered or ordered/prescribed (OR=1.59; 95% CI: 0.91–2.79).

## DISCUSSION

We examined where cancer patients received their care and whether the setting of care affected the treatment cancer patients received. Our results indicate that 13% of patients visited hospital clinics, with the remain-

der visiting office-based practices. Similar to the general population,<sup>15</sup> we found that young people, those insured by Medicaid and the uninsured are represented at greater proportions in hospital clinics than in office practices. Conversely, older persons and those with Medicare coverage are represented in higher proportions in office practices than in hospital clinics. More patients with lung/laryngeal and leukemia/lymphoma were seen in hospital-based clinics with more breast, prostate and colorectal cancer, and melanoma patients seen in office-based practices. After controlling for age at visit, cancer type, number of visits in past year and patient's chief complaint, race and ethnicity did not predict whether cancer patients visited hospital-based clinics.

Similar to findings from the Institute of Medicine's report, the setting of care differed by cancer type.<sup>1</sup> The most notable differences were for prostate cancer patients, where 96% of patients visited a physician's office (with 76.9% to urologists). In the hospital clinic, 42% of prostate cancer patients visited surgery clinics. Few cancer patients visited pediatricians in the office-based setting. For those

cancers with a higher incidence among children, such as leukemia or lymphoma, 21.5% of patients visited hospital-based clinics. For leukemia or lymphoma patients who visited hospital-based clinics, 34% of patients attended pediatric clinics, and approximately one-half of patients aged <15 had anticancer therapy administered, ordered or prescribed (data not shown). This finding confirms that pediatric patients with leukemia or lymphoma are being seen in hospital-based clinics where pediatric hematology/oncology specialists practice and that chemotherapy is likely to be administered or prescribed. Hospital-based clinics are more likely to be in academic centers, where supportive care, such as transfusion services and specialists, in infectious disease is more likely to be available. More than 90% of children aged ≤14 are treated in clinical trials that are based in hospitals.<sup>20</sup>

The administration of anticancer treatment has been reported by others to vary by the setting of treatment.<sup>21-23</sup> Contrary to these studies, we found that race and ethnicity did not predict whether anticancer therapy would be administered or prescribed. Our findings of no difference

**Table 3 Adjusted odds ratios\* for patients who visited a hospital-based clinic compared to office-based clinic, 2001–2003**

Characteristic	Adjusted OR† (95% CI)	P Value
Age at Visit (Years)		0.005
<24	9.4 (2.78–31.8)	
25–44	1.95 (0.78–4.86)	
45–64	2.30 (1.11–4.77)	
65–74	1.27 (0.81–1.98)	
≥75	1.0	
Race		0.94
White	1.0	
Black	0.96 (0.53–1.72)	
Other	0.79 (0.21–2.94)	
Hispanic Ethnicity		0.09
Yes	0.77 (0.30–2.01)	
No	1.0	
Unknown	0.34 (0.12–0.93)	
Sex		0.97
Female	1.0	
Male	0.99 (0.74–1.34)	
Health Insurance		0.001
Private	1.0	
Medicare	1.37 (0.76–2.48)	
Medicaid	4.09 (2.10–7.96)	
Uninsured	1.63 (0.68–3.92)	
Other	1.37 (0.41–4.53)	
Patient's Reason for Visit		<0.0001
Symptoms	0.39 (0.21–0.75)	
Cancer	0.53 (0.25–1.12)	
Chemotherapy/injections	1.87 (0.91–3.82)	
Exams/tests/medications	1.21 (0.64–2.29)	
Pre-/postoperative/other follow-up	0.55 (0.25–1.19)	
Other	1.0	
Primary Care Provider		0.01
Yes	0.44 (0.24–0.83)	
No	1.0	

by setting of treatment may be due to the method of data collection by NCHS. These data were recorded by the provider or abstracted from the office or hospital clinic charts, and thus the treatment cancer patients received or were prescribed may be more complete. As expected cancers for which we would expect systemic therapy not to be given (lung/laryngeal cancer), patients were less likely to have anticancer therapy recorded than patients with breast cancer. Of note, leukemia or lymphoma patients were also less likely to receive anticancer therapy, reflecting the predominance of older patients who tend to have chronic leukemia/lymphoma not requiring therapy.

This study has several strengths. First, the NAMCS/NHAMCS provides the only nationally representative data describing cancer patient ambulatory care visits in the United States that allow for the calculation of population-based estimates of cancer patients and the content of those visits. This current analysis represents an estimated 4.5 million cancer patients per year (1.1 million new patients). To date, the most complete study examined the prevalence of cancer care in the inpatient and outpatient settings for persons aged  $\geq 65$  years with colorectal cancer.<sup>24</sup> Our study was much more comprehensive and detailed. We found that cancer patient visits in ambulatory settings were for chronic problems, mostly routine,

with 81% of visits made by cancer patients with  $\geq 1$  visits in the last year (Table 1). Second, the data in this report were abstracted from the patient's medical record, likely resulting in more accurate and complete collection of data on anticancer treatment received or prescribed. Information was not dependent upon the recall of the provider or patient. Most reports of cancer care are derived from administrative databases, where care is assumed to have occurred if a claim is found for the service, or from hospital-based cancer registries. In such databases, information on chemotherapy is not complete because it is usually given in nonhospital-based settings.<sup>25-27</sup>

Our study also has several limitations that may limit interpretation of our results. First, we were unable to determine the stage of cancer or the time since diagnosis. This limits any conclusions we are able to make regarding the appropriateness of therapy for any given cancer site. From the literature on colon cancer, we know the most intense treatment occurs in the first year after diagnosis.<sup>24</sup> Since anticancer therapy is more likely to be given in the first year, this supports our findings that cancer patients with fewer visits each year were less likely to receive anticancer therapy. Second, our study is cross-sectional, and thus we cannot infer causation between the predictors examined in our models and the outcomes (setting of care

**Table 3. continued**

Characteristic	Adjusted OR <sup>†</sup> (95% CI)	P Value
Major Reason for Visit (per Provider)		0.16
Acute problem	1.14 (0.54–2.43)	
Chronic problem (routine)	1.0	
Chronic problem (acute)	1.24 (0.64–2.42)	
Pre- or postsurgery	0.40 (0.19–0.86)	
Preventive care	1.11 (0.30–4.16)	
Unknown	0.60 (0.13–2.84)	
Visits in Last Year		0.003
New patient	0.55 (0.87–1.13)	
None	0.38 (0.16–0.89)	
1–2	0.42 (0.24–0.73)	
3–5	0.44 (0.26–0.77)	
$\geq 6$	1.0	
Unknown	0.17 (0.02–1.19)	
Cancer Site <sup>‡</sup>		<0.00001
Lung/larynx	1.99 (0.98–4.06)	
Female breast	1.0	
Prostate	0.32 (0.15–0.72)	
Colorectal	0.66 (0.35–1.23)	
Lymphoma/leukemia	1.40 (0.69–2.83)	
Melanoma	0.78 (0.29–2.09)	
Other cancers	1.63 (0.88–3.05)	
Anticancer Therapy <sup>§</sup>		0.34
Yes	1.30 (0.76–2.24)	
No	1.0	

\* Odds ratios are significant if the CI (confidence interval) does not cross 1.0; † Visits were considered cancer related if the principal diagnosis was coded as malignant neoplasm (ICD-CM-09=140–208). These estimates exclude nonmelanoma skin cancer; ‡ In the 9th Edition of the International Classification of Diseases (ICD-CM-09): larynx, lung = 161–162; female breast = 174; prostate = 185; colon, rectum = 153, 154; lymphoma/leukemia = 200–208; melanoma = 172; other cancers = all other malignancies<sup>18</sup>; § Anticancer therapy administered or prescribed during the visit including antineoplastic; hormonal or biological response modifier; antimetabolites; antibiotics, alkaloids, or enzymes; or DNA-damaging drugs.<sup>19</sup>

and use of anticancer therapy). Third, we were not able to explore differences between subpopulations due to small sample sizes. Fourth, given that the NAMCS response rate was 65%, our results may not be generalizable to the total U.S. cancer patient population. Our results might be biased by the fact that physicians and hospitals funded exclusively by the federal government were excluded. We do not feel this is a problem, as only 2% of physicians and <4% all U.S. hospitals were excluded,<sup>28,29</sup> and sampling weights have been applied to account for these differences. Finally, no data are available for cancer patients being treated with radiation therapy.

## Implications for Policy

Current estimates show that there are 10.1 million survivors in the United States, with an additional 1.4 million new cancers diagnosed each year.<sup>30,31</sup> Not surprisingly, some of the most vulnerable cancer patients in our society, including younger patients, the uninsured

and those insured by Medicaid, were overrepresented in the hospital clinic population. These findings agree with findings for all ambulatory visits.<sup>12</sup> The good news is that we did not find that setting of care affected whether anticancer treatment was prescribed or administered. Rather, treatment with anticancer agents seems to have been based on the type of cancer for which the visit was made. On the downside, the one coverage category that affected whether anticancer treatment was prescribed or administered was being uninsured. This population is the most vulnerable in accessing cancer care, which is very expensive and can go on for extended periods (a minimum of 4–6 months and a maximum of the remainder of the patient's life). Policies must be strengthened or put into place to ensure that all persons with cancer have equal access to life-saving therapies.

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**Table 4. Adjusted odds ratios\* to predict whether anticancer therapy was administered or prescribed to cancer patients during a visit, 2001–2003**


Characteristics	Adjusted OR†	P Value
Health Insurance		
Private	1.0	0.85
Medicare	1.01 (0.57–1.79)	
Medicaid	0.81 (0.44–1.49)	
Uninsured	0.56 (0.09–3.37)	
Other	0.72 (0.32–1.61)	
Patient's Reason for Visit		
Symptoms	0.69 (0.31–1.57)	0.0008
Cancer	1.51 (0.70–3.27)	
Chemotherapy/injections	6.75 (1.85–24.7)	
Exams/tests/medications	1.64 (0.73–3.67)	
Pre-/postoperative, or other follow-up	3.28 (1.28–8.37)	
Other	1.0	
Visits in the Previous Year		
New patient	0.04 (0.02–0.08)	<0.00001
None	0.09 (0.03–0.31)	
1–2	0.33 (0.20–0.55)	
3–5	0.70 (0.43–1.12)	
≥6	1.0	
Unknown	0.96 (0.55–1.67)	
Cancer Site‡		
Lung/larynx	0.20 (0.10–0.39)	<0.00001
Female breast	1.0	
Prostate	0.80 (0.32–2.01)	
Colorectal	0.44 (0.13–1.56)	
Lymphoma/leukemia	0.20 (0.11–0.36)	
Melanoma	0.04 (0.01–0.15)	
Other	0.25 (0.13–0.49)	
Setting		0.16
Office based	1.0	
Hospital based	1.59 (0.91–2.79)	

Odds ratios are significant if the confidence interval (CI) does not cross 1.0; Visits were considered cancer related if the principal diagnosis was coded as malignant neoplasm (ICD-CM-09 = 140–208); † The full model adjusts for age at diagnosis, race, ethnicity, patient sex, health insurance, visits in the past year, cancer site, and setting where cancer treatment occurred; ‡ In the 9th Edition of the International Classification of Diseases (ICD-CM-09): larynx, lung = 161–162; female breast = 174; prostate = 185; colon, rectum = 153, 154; lymphoma/leukemia = 200–208; melanoma = 172; other = all other malignancies. Estimates excluded nonmelanoma skin cancer.<sup>18</sup>



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